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AN INSECT SELECTIVITY CAGE FOR TESTING PLANT REPELLENCE

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A revolving cage used in experiments with repellent sprays against the beet leafhopper (Eutettix tenellus (Bak.) and in determining the comparative aversion of this insect to different varieties of sugar beets and beans has been described by Gillett and Douglass.[1] This cage undoubtedly fulfilled the purpose for which it was designed, but it had several disadvantages for selectivity studies of the repellence of different tomato plants. Consequently, a different type of selectivity cage was devised wherein only leaves of the plants were used. This eliminated the necessity of having the plants potted and the danger of losing the test plants by disease. Also, only those leafhoppers that had actually selected a leaf and were feeding thereon were counted, while those sitting on the floor of the cage were ignored.

Construction

The machine consisted of the following three sections: (1) A horizontal circular platform, 24 inches in diameter and 1 inch thick, mounted on a ball-bearing central pinion. The platform made three turns per minute, the speed being governed by a reduction gear, with power furnished by a small electric motor (fig. 1). (2) On this platform was placed a sheet of 20-gauge galvanized iron approximately 24 inches in diameter. Thirty half-inch, numbered holes were punched equal distances apart about 3 inches inside the outer edge (fig. 2). (3) On the top rested a bottomless celluloid cage 22 inches in diameter and 9 inches high, with a hole in the middle of the top provided with a cork stopper.

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[1] Gillett, J. A., and Douglass, J. R. A revolving plant cage for use in insect selectivity studies. U. S. Dept. Agr. Bur. Ent. and Plant Quar., ET-139, 3 pp., illus. 1939. (Processed.)

The lower edge of the celluloid was faced with felt to prevent slipping and to make the cage insect-tight.

Operation

In the use of the cage, a tomato leaflet was placed under each hole of the galvanized sheet and held in place by a pad and adhesive tape. The celluloid cage was put in place and the machine started. The desired number of leafhoppers were inserted into the middle of the cage through the hole in the top. Every 15 minutes a record was made of the number of leafhoppers actually feeding at each hole. No record was made of the leafhoppers sitting on the floor of the cage. After each observation all leafhoppers were blown off the leaves. Thus the number recorded at each observation was the result of new selection and not an accumulation from previous observations.

Efficiency

In testing the efficiency of this selectivity cage, pads of cotton moistened with 10-percent sugar solution were used instead of leaves. The cotton pads were as nearly as possible the same size and an equal quantity of sugar solution was used on each pad. Thus feeding conditions were practically uniform within the cage. Results from three tests showed no significant differences between the numbers feeding at any of the holes of the cage. When figured by the chi-square method with n equal to 29, the P values were 0.09, 0.12, and 0.38.

This cage has proved very satisfactory for demonstrating the repellence of different tomato plants to the beet leafhopper, and with any needed modification it could be used for other insects or plants.

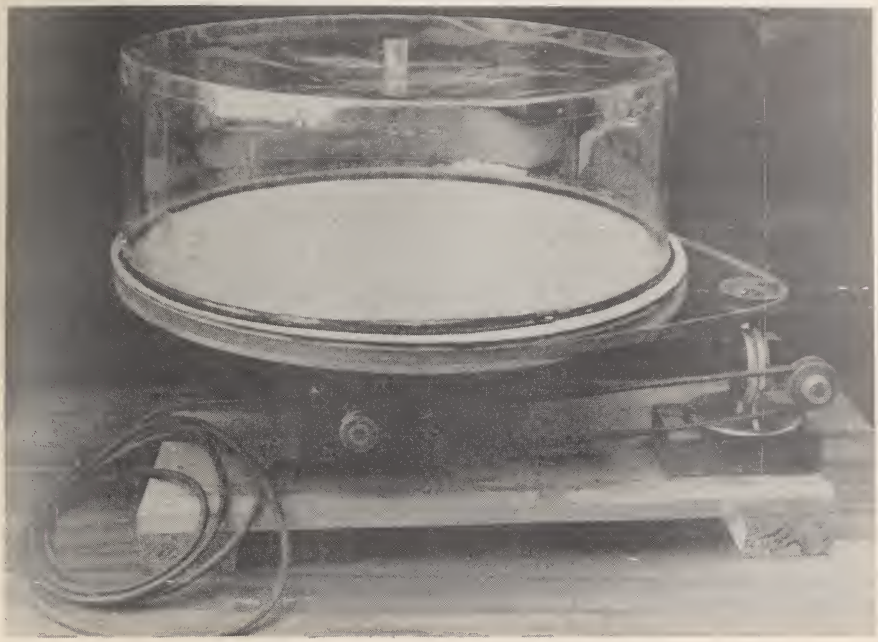

Figure 1.--Rotating cage for testing samples of leaves for attractiveness or repellency. The motor is beneath the turntable.

Figure 2.--Top view of rotary platform, showing numbered holes under which the leaf samples are fastened. The reduction gear is shown at lower right.